What is claimed is:

1. An audio signal processing apparatus for reproducing an audio signal by decoding encoded predictive residual signals produced by forward prediction on a frame by frame basis, the apparatus comprising:

an excitation source modifying means for extending or shortening said predictive residual signals on a time axis and

a synthesizing means for synthesizing an audio signal based on predictive residual signals converted by said excitation source modifying means.

2. An audio signal processing apparatus as set forth in claim 1, said excitation source modifying means comprising:

dividing means for dividing said predictive residual signals into a plurality of sub-frames based on a pitch;

second dividing means for dividing a signal of a sub-frames into first signal whose length is m (m is an integer and m<L, L is the length of said sub-frame) and the remaining signal whose length is (L-m) as a reference signal;

finding means for finding the closest signal of said reference signal from other sub-frame,

wherein said excitation source modifying means shortens said predictive residual signals by concatenating the first signal and the closest signal.

3. An audio signal processing apparatus as set forth in claim 2, wherein said finding means calculates cross-correlation values with said reference signal for signal of said other sub-frame, takes out signal as the closest signal from a position where the calculated cross-correlation value becomes the largest.

4. An audio signal processing apparatus as set forth in claim 2, wherein said finding means calculates a square error with said reference signal for signal of said other sub-frame, takes out signals as the closest signal from a position where the calculated square error becomes the smallest.

5. An audio signal processing apparatus as set forth in claim 1, wherein

said excitation source modifying means extends said predictive residual signals by a certain extension rate by finding a signal having a predetermined length from the end of the predictive residual signals of a frame; and

concatenating said signal after the end of the predictive residual signals to generates extended predictive residual signals.

6. An audio signal processing apparatus as set forth in claim 1, wherein said synthesizing means is a linear prediction code synthesis filter.

7. An audio signal processing apparatus for reproducing an audio signal by decoding encoded predictive residual signals produced by forward prediction on a frame by frame basis, the apparatus comprising:

an excitation source modifying means for shortening the predictive residual signals by taking out first signal from signal in a sub-frame of the predictive residual signals and second signal from signal in a following sub-frame based on cross-correlation while maintaining the pitch, or for extending the predictive residual signals by connecting data estimated by extrapolation to signals of a frame while maintaining the pitch, and

a synthesizing means for synthesizing an audio signal based on predictive residual signals converted by said excitation source modifying means.

8. An audio signal processing apparatus as set forth in claim 7, said excitation source modifying means comprising:

dividing means for dividing a signal of said sub-frame into the first signal whose length is m (m is

an integer and m<L, L is the length of said sub-frame) and the remaining signal whose length is (L-m) as a reference signal;

finding means for finding the closest signal of said reference signal from the other sub-frame,

wherein said excitation source modifying means shortens said predictive residual signals by concatenating the first signal and the closest signal.

9. An audio signal processing apparatus as set forth in claim 8, wherein

said excitation source modifying means comprises:

a first multiplying means for multiplying said reference signal by a first window function;

a second multiplying means for multiplying signal taken out from said other sub-frame by a second window function; and

an adding means for adding results of said first and second multiplying means; and

wherein said excitation source modifying means concatenates the results of said adding means after the first signal taken out from said sub-frame to generate one pitch worth of new predictive residual signals.

10. An audio signal processing apparatus as set forth in claim 8, wherein said finding means calculates

cross-correlation values with said reference signal for signal of said other sub-frame, takes out signal as the closest signal from a position where the calculated cross-correlation value becomes the largest.

11. An audio signal processing apparatus as set forth in claim 8, wherein said finding means calculates a square error with said reference signal for signal of said other sub-frame, takes out signal as the closest signal from a position where the calculated square error becomes the smallest.

12. An audio signal processing apparatus as set forth in claim 7, wherein said excitation source modifying means extends said predictive residual signals by a certain extension rate by finding a signal having a predetermined length from the end of the predictive residual signals of a frame; and concatenating said signal after the end of the prediction residual signals to generates extended predictive residual signals.

13. An audio signal processing apparatus as set forth in claim 7, wherein said synthesizing means is a linear prediction code synthesis filter.

14. An audio signal processing method for extending or shortening predictive residual signals on a time axis in decoding of a signal encoded by forward prediction on a frame by frame basis, comprising:

processing for shortening the predictive residual signals by taking out first signal from signal in a sub-frame of the predictive residual signals and second signal from signal in a following sub-frame based on cross-correlation while maintaining the pitch or for extending the previous residual signals by connecting data estimated by extrapolation to signals of a frame while maintaining the pitch so as to shorten or extend the signals of one frame, and

processing for synthesizing an audio signal based on such shortened or extended predictive residual signals.

15. An audio signal processing method as set forth in claim 14, further comprising shortening said predictive residual signals by

dividing a signal of said sub-frame into the first signal whose length is m (m is an integer and m<L, L is the length of said sub-frame) and the remaining signal whose length is (L-m) as a reference signal;

finding the closest signal of said reference signal from the other sub-frame; and

concatenating the first signal and the closest signal.

16. An audio signal processing method as set forth in claim 15, further comprising shortening said

predictive residual signals by

first multiplication processing for multiplying said reference signal by a first window function;

second multiplication processing for multiplying signal taken out from said other sub-frame by a second window function; and

adding processing for adding results of said first and second multiplying means and

concatenating the results of said adding processing after the first signal taken out from said sub-frame to generate one pitch worth of new predictive residual signals.

17. An audio signal processing method as set forth in claim 14, further comprising extending said predictive residual signals by a certain extension rate by finding a signal having a predetermined length from the end of the predictive residual signals of a frame; and concatenating said signal the end of the predictive residual signals to generates extended predictive residual signals.